

REMARKS

Claims 1-20 were presented for examination, are pending and are rejected. Reconsideration is respectfully requested.

The 35 U.S.C. § 102 Rejections

Claims 1, 4 and 5 are rejected under 35 USC 102(e) as being anticipated by Mearini et al. The rejection is respectfully traversed.

The reference describes a process for reducing the roughness of various layers deposited onto a near atomically smooth substrate. Thus, the reference does not provide a substrate with a defect. To further distinguish the applicants' invention, claims 1 and 16 have been amended to recite that the defect has a diameter within a range from about 20 nm to about 50 nm. This range is supported by the originally filed specification. Page 7, lines 1-4 states: "the multilayer buffer-layer must smooth over the surface topology due to defects of at least several tens of nm in size, and the multilayer deposition process should not add significant amounts of particles". The application thus teaches the lower boundary of the range to be "at least several tens of nm in size", i.e., about 20 nm. The upper boundary of the range is taught in multiple places in the specification, e.g., page 8, line 21 through page 9, line 2, states: "However, when the optimized ion-assisted smoothing process, i.e., sequential etching of the Si layers, is implemented, the ~50 nm high spheres are smoothed to a mean defect height of 0.92-1.03 nm, a significant

improvement". Thus, the disclosed upper boundary is about 50 nm. The applicant does not admit that the invention will not smooth substrate defects that have a diameter outside of the disclosed range. Column 4, lines 61-63 of the reference defines "atomically smooth" as a surface roughness of approximately less than 0.05 nm. Thus, the reference does not disclose a substrate defect within the applicants' range of from about 20 nm to about 50 nm. Therefore the rejection of claim 1 should be withdrawn. The rejection of claims 4 and 5 should be withdrawn because they depend from claim 1.

Claims 1-8, 10, 14 and 16-19 are rejected under 35 USC 102(e) as being anticipated by Murakami et al. The rejection is respectfully traversed.

Unlike the present claims 1 and 16, the reference does not provide a substrate with a defect nor does it teach the mitigation of a topological defect of a substrate. The reference teaches smoothing the interface between successive layers of a multilayer. It uses ion beam deposition to reduce high spatial frequency roughness. Therefore the rejection of claims 1 and 16 should be withdrawn. Claims 2-8, 10 and 14 depend from claim 1. Claims 17-19 depend from claim 16. Therefore the rejection should be withdrawn.

Claims 1-8, 10, 14 and 16-19 are rejected under 35 USC 102(e) as being anticipated by Yakshin et al. The rejection is respectfully traversed.

Unlike the present claims 1 and 16, the reference does not provide a substrate with a defect nor does it teach the mitigation of a topological defect of a substrate. The reference uses ion beam deposition to reduce high spatial frequency roughness. The reference teaches smoothing individual coatings on a substrate. Therefore the rejection of claims 1 and 16 should be withdrawn. Claims 2-8, 10 and 14 depend from claim 1. Claims 17-19 depend from claim 16. Therefore the rejection should be withdrawn.

The 35 U.S.C. § 103 Rejections

Claims 6 and 15 are rejected as being unpatentable over Mearini et al. The rejection is respectfully traversed.

Claims 6 and 15 depend from claim 1, which should be allowable over Mearini et al. as discussed above. Therefore the rejection should be withdrawn.

Claims 7, 16 and 18 are rejected as being unpatentable over Mearini et al. in view of Lu et al. and Fairbairn et al. The rejection is respectfully traversed.

Unlike the present claims 1 and 16, none of the references provide a substrate with a defect nor do they teach a method that mitigates the topological defects of a substrate. Lu et al. controls the polarization properties in a ring laser. Fairbairn et al. improves the properties of carbon films. The rejection of claim 7 should be withdrawn because it depends from claim 1. Unlike the present claim 16, none of the references provide an EUV reticle that has a topological defect, the reticle including planarized

amorphous layers. The rejection of claim 18 should be withdrawn because it depends from claim 16. Therefore the rejection should be withdrawn.

Claim 14 is rejected as being unpatentable over Mearini et al. in view of Schmidt et al. The rejection is respectfully traversed.

Claim 14 should be allowable because it depends from claim 1, which should be allowable as discussed above. Therefore the rejection should be withdrawn.

Claims 1-8, 10, 14 and 16-19 are rejected as being obvious over Murakami et al. The rejection is respectfully traversed.

Unlike the present claims 1 and 16, the reference does not provide a substrate with a defect nor does it teach the mitigation of a topological defect of a substrate. The reference teaches smoothing the interface between successive layers of a multilayer. Therefore the rejection of claims 1 and 16 should be withdrawn. Claims 2-8, 10 and 14 depend from claim 1. Claims 17-19 depend from claim 16. Therefore the rejection should be withdrawn.

Claims 9, 13 and 20 are rejected as being obvious over Murakami et al. in view of Hawryluk. The rejection is respectfully traversed.

Note that Hawryluk uses thin films to change the shape of a surface with a thin film on a large scale. The rejection of claims 9 and 13 should be withdrawn because they depend from claim 1, which should be allowable as discussed above. The rejection

of claim 20 should be withdrawn because it depends from claim 16, which should be allowable as discussed above. Therefore the rejection should be withdrawn.

Claim 11 is rejected as being obvious over Murakami et al. in view of Mirkarimi et al. The rejection is respectfully traversed.

Mirkarimi et al. is the only reference cited by the Examiner that has any relevance to the present invention because it does mitigate a substrate defect; however, it accomplishes the purpose in a completely different way. In Mirkarimi et al., a multilayer film is used as a buffer layer to minimize the size of defects on a reticle substrate prior to deposition of a reflective coating on the substrate. The multilayer buffer layer deposited intermediate the reticle substrate and the reflective coating produces a smoothing of small particles and other defects on the reticle substrate. The reduction in defect size is controlled by surface relaxation during the buffer layer growth process and by the degree of intermixing and volume contraction of the materials at the multilayer interfaces. The reference does not use any means to etch the buffer layer.

The rejection of claim 11 should be withdrawn because it depends from claim 1, which should be allowable as discussed above. Therefore the rejection should be withdrawn.

Claim 12 is rejected as being obvious over Murakami et al. in view of Knapp et al. The rejection is respectfully traversed.

Knapp et al. uses the ion beam to get better abrasion resistance. The rejection of claim 12 should be withdrawn because it depends from claim 1, which should be allowable as discussed above. Therefore the rejection should be withdrawn.

Claim 15 is rejected as being obvious over Murakami et al. The rejection is respectfully traversed.

The rejection of claim 15 should be withdrawn because it depends from claim 1, which should be allowable as discussed above. Therefore the rejection should be withdrawn.

Claims 1-8, 10, 14 and 16-19 are rejected as being unpatentable over Yakshin et al. The rejection is respectfully traversed.

Unlike the present claims 1 and 16, the reference does not provide a substrate with a defect nor does it teach the mitigation of a topological defect of a substrate. The reference teaches smoothing individual coatings on a substrate. Therefore the rejection of claims 1 and 16 should be withdrawn. Claims 2-8, 10 and 14 depend from claim 1. Claims 17-19 depend from claim 16. Therefore the rejection should be withdrawn.

Claims 9, 13 and 20 are rejected as being unpatentable over Yakshin et al. in view of Hawryluk. The rejection is respectfully traversed.

The rejection of claims 9 and 13 should be withdrawn because they depend from claim 1, which should be allowable as discussed above. The rejection of claim 20

should be withdrawn because it depends from claim 16, which should be allowable as discussed above. Therefore the rejection should be withdrawn.

Claim 11 is rejected as being unpatentable over Yakshin et al. in view of Mirkarimi et al. The rejection is respectfully traversed.

The rejection of claim 11 should be withdrawn because it depends from claim 1, which should be allowable as discussed above. Therefore the rejection should be withdrawn.

Claim 12 is rejected as being unpatentable over Yakshin et al. in view of Knapp et al. The rejection is respectfully traversed.

The rejection of claim 12 should be withdrawn because it depends from claim 1, which should be allowable as discussed above. Therefore the rejection should be withdrawn.

Claims 1-4 are rejected as being unpatentable over Sasai et al. in view of Murakami et al. The rejection is respectfully traversed.

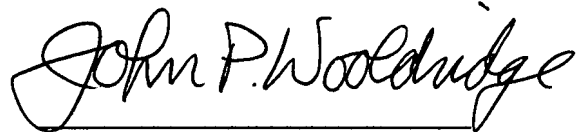
Neither reference teaches the mitigation of a topological defect of a substrate, as recited in the present claim 1. Claims 2-4 depend from claim 1. Therefore the rejection should be withdrawn.

Conclusions

It is submitted that this application is in condition for allowance based on claims 1-20 in view of the amendments thereto and the foregoing comments.

If any impediments remain to prompt allowance of the case, please contact the undersigned at 808-875-0012.

Respectfully submitted,

A handwritten signature in black ink, reading "John P. Wooldridge". The signature is written in a cursive style with a horizontal line underneath the name.

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